
DMS-4610

Fly Ash

Effective Date: **JULY 2020**



1. DESCRIPTION

This Specification establishes the requirements, test methods, and the Fly Ash Quality Monitoring Program (FAQMP) for non-blended and blended fly ash, modified fly ash (MFA), and ground bottom ash (GBA) used in concrete products. Non-blended fly ash is the finely divided residue or ash that remains after burning finely pulverized coal at high temperatures. Blended fly ash is fly ash blended by interblending or intergrinding with other supplementary cementing materials including other fly ash, slag cement, natural pozzolans, etc. MFA is a non-blended or blended fly ash produced by intergrinding with or without additional additives. GBA is the coarse residue or ash that remains after burning finely pulverized coal at high temperature and is ground to finer material.

2. UNITS OF MEASUREMENTS

The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

3. MATERIAL PRODUCER LIST

The Materials and Tests Division (MTD) maintains the Material Producer List (MPL) of all materials conforming to the requirements of this Specification. Materials appearing on the MPL, entitled "Fly Ash," require no further sampling and testing before use, unless deemed necessary by the Project Engineer or MTD.

4. BIDDERS' AND SUPPLIERS' REQUIREMENTS

The Department will only purchase or allow on projects those products accepted into the FAQMP and listed by producer and product code or designation shown on the MPL.

Use of pre-qualified product does not relieve the Contractor of the responsibility to provide product that meets this Specification. The Department may inspect or test material at any time and reject any material that does not meet the specifications.

5. QUALIFICATION PROCEDURE

5.1. **Pre-Qualification Request.** Submit a request for evaluation under DMS-4610 to DMS_Prequal@txdot.gov.

Include the following information in the request:

- name, address, and contact information for the supplier;
- name and location of the power plant or production plant;
- coal origin and classification being used by the power plant;
- class of fly ash being collected;
- sources of materials to be blended;

- capacity of the storage facilities;
- six months of weekly physical and chemical test data meeting Article 4610.6 of this Specification; and
- details of the supplier's Quality Control Program, including measures taken to ensure that fly ash meeting the requirements of this Specification is kept separate from fly ash that does not, including, but not limited to, fly ash produced during power plant shutdown, start-up, or other transient operational periods. For the imports, the Quality Control Program of the supplier in Texas is also required.
- Information about the laboratory that performs all tests required in Article 6.

5.1.1. **Criteria for Acceptance.** The laboratory or laboratories performing the physical and chemical tests for the supplier must be inspected by the Cement and Concrete Reference Laboratory (CCRL) and participate in the Pozzolan Proficiency Program, for the tests performed in Article 6.

The supplier must have a permanent location and:

- be located in the State of Texas,
- maintain an established terminal within Texas through which all fly ash must pass, or
- agree to reimburse the Department for all sampling expenses based on mileage and per diem costs for Department personnel traveling outside the State or for direct costs of sampling and shipping when sampling is accomplished through third-party agreements.

5.2. **Sampling and Testing.** Schedule sampling at the mutual convenience of the Department and the producer. Sampling will be in accordance with [Tex-733-I](#). Testing will be in accordance with the requirements of Article 6.

Monthly QM samples should be received by the 15th of each month. The Department reserves the right to conduct random sampling of materials for testing and to perform random audits of test reports.

Department representatives may sample material from the plant, terminal, transportation containers, and concrete plants to verify compliance with this Specification.

5.3. **Evaluation.** MTD will notify prospective bidders and suppliers after completion of material evaluation. If approved for Department use, MTD will accept the material to the FAQMP and add it to the MPL.

To remain on the FAQMP, producers must submit the following:

- monthly test report containing the following information:
 - test results, performed by a CCRL inspected laboratory, that shows the fly ash complies with the requirements of this Specification;
 - materials used to produce blended fly ash, and proportions used,
- monthly sample from each approved unit collected in accordance with [Tex-733-I](#).

Note—The sample size must be approximately 1 pt., or 2.5 lb., of fly ash. Mail the sample with a Safety Data Sheet (SDS) to the Texas Department of Transportation, Materials and Tests Division, Rigid Pavements and Concrete Materials Section (CP51), 9500 North Lake Creek Parkway, Austin, Texas 78717.

Major changes to the fly ash produced will require re-qualification of the source. Notify the Department when a change in production occurs. This includes, but is not limited to, changes in a coal source or major alteration of plant operations.

5.4. **Failure.** Producers not qualified under this Specification may not furnish materials for use on Department projects.

Producers failing to qualify may submit a request for re-evaluation after 12 mo. have elapsed from the date of the original request. MTD may modify this time limit at its discretion. In the request for re-evaluation, document the cause of the issue and corrective action taken.

The Department normally bears the costs of sampling and testing; however, the producer will bear the costs associated with materials failing to conform to the requirements of this Specification. The Director of MTD will assess this cost at the time of testing, and amounts due will be billed to the producer.

- 5.5. **Periodic Evaluation.** The Department reserves the right to conduct random sampling and testing of pre-qualified materials to verify performance and Specification compliance and to perform random audits of documentation. Department representatives may sample material from the plant, terminal, transportation containers, and concrete plants.

Failure of materials to comply with the requirements of this Specification as a result of periodic evaluation may be cause for removal of those materials from the MPL. In case of variance, the Department's tests will govern.

- 5.6. **Disqualification.** Causes for disqualification and removal from the MPL may include, but are not limited to:

- any change in production procedures impacting fly ash quality or composition,
- producer fails to meet the reporting any testing requirements of this Specification,
- producer fails to report any change in material composition or production to MTD,
- any material sample fails to meet the requirements of this Specification,
- falsification of documentation, or
- producer has unpaid charges for failing samples.

MTD will remove disqualified producers from the MPL and will not allow submission of material for re-qualification for 12 mo., at the discretion of the Department.

- 5.7. **Re-Qualification.** Once the disqualification period established by MTD has elapsed, producers disqualified and removed from the MPL may begin the re-qualification process by submitting a request in accordance with Section 5.1, including additional documentation identifying the cause of the problem and corrective action taken. The re-qualification process will then follow all subsequent Sections of Article 5.

The Department normally bears the costs of sampling and testing; however, the disqualified producer will bear the costs associated with re-qualification. The Director of MTD will assess this cost at the time of re-evaluation, and amounts due will be billed to the producer.

6. MATERIAL REQUIREMENTS

Non-blended and blended fly ash, and GBA must meet all the physical and chemical requirements of Table 1. Sources with average Calcium Oxide contents from the last ten samples $\geq 18.0\%$ will not be allowed for use in sulfate resistant concrete.

Table 1

Fly Ash Specification Requirements

Item	Limit	Test Method
Chemical Composition: Average CaO content of the last ten samples, %	Report Only	ASTM C 114
Sulfur Trioxide (SO ₃), maximum, %	5.0	ASTM C 114
Magnesium Oxide (MgO), %	Report Only	ASTM C 114
Total Alkali Content, expressed as Na ₂ O _{eq} , %	Report Only	ASTM C 114
Strength Activity Index ¹ : <ul style="list-style-type: none"> 7-day, minimum, % of control 28-day, minimum, % of control 	75 75	ASTM C 311
Fineness: <ul style="list-style-type: none"> Amount retained when wet-sieved on 45-μm sieve, maximum, % 	34	ASTM C 311

Uniformity of Fineness: % points from average of last 10 test results or by all preceding tests if the number is less than ten	Report Only	
Water requirement, maximum % of control	105	ASTM C 311
Moisture content, maximum, %	2.0	ASTM C 311
Loss on ignition, maximum, %	6.0	ASTM C 311
Density Uniformity of Density: maximum variation from average of last 10 test results or by all preceding tests if the number is less than ten, %	Report Only 5	ASTM C 188
Autoclave Soundness, maximum, %	0.8	ASTM C 311
The Department will determine the Effectiveness in Controlling Alkali-Silica Reaction ² : 14 day maximum expansion limit, %, when tested using a fine aggregate with a ASTM C 1260 expansion $\geq 0.30\%$,	0.10	ASTM C 1567
1. Meeting either the 7-day or 28-day is acceptable. 2. The Department will perform this test annually. Material producers will not have to report this testing on the material certificates.		

The Department will report on the Material Producer's List:

- the minimum dosage needed to control alkali-silica reaction for each fly ash having a Calcium Oxide Content $< 18.0\%$,
- sources that must use Item 421 Option 8 to determine minimum dosage needed to effectively control alkali-silica reaction, and
- sources not allowed to be used when sulfate resistant concrete specified on the plans.

6.1. **Modified Fly Ash.** Modified fly ash must meet the requirement of Table 1, with the exceptions and additions listed in Table 2.

Table 2
Additional Specification Requirements for MFA

Item	Limit	Test Method
Strength Activity Index <ul style="list-style-type: none"> 28-day, minimum, % of control 	95	ASTM C 989
Fineness: Amount retained when wet-sieved on 45- μ m sieve, maximum, %	10	ASTM C 311
Uniformity of Fineness: maximum variation, % points from average of last 10 test results or by all preceding tests if the number is less than ten	3	
The Department will determine the Effectiveness in Controlling Alkali-Silica Reaction ¹ : 14 day maximum expansion limit, %, when tested using a fine aggregate with a ASTM C 1260 expansion $\geq 0.30\%$,	0.10	ASTM C 1567
Expansion of Mortar Bars with 50% replacement, max %	0.02	ASTM C 1038
1. The Department will perform this test annually. Material producers will not have to report this testing on the material certificates.		

7. ARCHIVED VERSIONS

Archived versions are available.